

Mr. CHAN: Our farm monitors the nutrients level by detectors connected to the computers. The automated system adds back pre-mixed chemical fertilisers immediately and accordingly. In response to the changes of pH and electricity conductivity in the fertiliser tank. He usually adds both A-solution and B-solution which contain more than 10 elements that the plants need.

1. When the plants are lack of element N, how can you know that by simply measuring the value EC?

Usually, plants with green leaves need more N, so we will use different types of nutrients depending on the products. For us, we will simply refer to the EC.

2. Will it be too late to add back the nutrients when the EC is low?

It won't as the sensors are working all the time so it can respond to the changes immediately just like the pH paper in the lab. Still, it will be a big problem when there is no water and electricity. Luckily, the rooms here are sealed so that the temperature will not fluctuate much.

3. Which one is better for the crops, especially for taste, organic fertilizers or chemical fertilizers?

In my view, there is no relation between the types of fertilizers and taste. In fact, the taste of crops depends on whether the fertilizers are sufficient. The nutrients will have great differences unless the plants are congenital deficient. Meanwhile, the environment (maintenance of humidity, air quality, nutrients and light intensity are required) and the farming process are very important to the plants. It is obvious that all nutrients have to be fresh without being stored for a long period of time.

All the crops are grown in an isolated room to provide clean environment for them. Everything is set to an optimum level for them, such as temperature, nutrients, so that they can grow healthier and faster. As long as the place can be installed with the required equipment, it is suitable for hydroponics. Every zone (4 zones → 3 shelves → 7 layers) has its own circulation system so that pre-mixed nutrients and water can be pumped into the system to maintain suitable environment for plants. Though the solution will be removed, plants can still obtain enough nutrients as the whole removal process under the sponge (act as substrate=>for support and gas/nutrients exchange) is slow. All the parts above the sponge can be ensured to be clean.

4. Since you are using liquid medium, when there is some solution left after the refill of nutrients, will you discard it?

The solution will be recollected and filtered.

5. Will the solution of different layers be collected separately?

Yes, it is quite similar to the water supply system in buildings. Nutrients will be transported to every layer separately so lots of pipes are installed. This is the same case for collecting back the solution.

6. Will the solution accumulate?

No, the absorption rate of the solution is really fast as around 300 plants grow on each tray and we have good system to remove the solution.

For lighting system, we use normal vegetation lamps instead of LED light bulbs because the growth durations of the crops don't take long. Timers are set to control the light cycle (18 cycles) moderately. The lamps won't be turned off or on at the same time.

7. Will the light be changed according to the actual time? For example, dimer in the evening.

No, we won't since we have to know the growth stage and the unit we use for measurement is photosynthetic photon flux density (PPFD). However, it depends on the types of plants.

Here we go to the usual practice on planting. We sow every day and place them at the bottom of the shelves after around 2 days to wait for the seedlings to grow. After 5 days, they will be placed on the 3rd layers of the shelves and cultivation starts. They can be harvested after 14 days. The total cycle is 21 days. Based on this cycle, we hope to make it automatic just like those in Japan. Then, the sale is ready. Thus, we are called "vegetable factory".

8. Can this be applied to fruit?

Of course, all plants need air, nutrients and light but we have to be aware of the space that a fruit tree required. As long as we provide them with the things they need, they can grow.

9. If you plant tomatoes, will the life cycle delay?

There are 2 types of tomatoes: terminate and indeterminate. Thus, the life cycle will base on the type you choose. However, it is a must to consider the space, time and chemicals, etc.

10. Will you adjust the amount of nutrients added to the plants according to the life cycle?

Yes, but it will waste a lot of time to mix it again, so we basically pay attention to the concentration of the components detected by the sensors.

11. Will you alter the setting in the computer so that they can automatically adjust the amounts of solution?

We can but we don't need this. The successful rate is quite high. Hygiene is one of the things that we have to bear in mind as fungi can grow in the solution.

12. Is hydroponics common in foreign countries?

Well, hydroponics has been developed for more than a decade, especially in the US, Britain and Australia. With the help of architect, hydroponics has bright future. In my opinion, responsible government should take this development into consideration as they should know how much healthy green the country is going to produce and import. If there are more experts, more vegetables can be produced.

We need manpower to pack the vegetables because they are fresh and very fragile. Gloves must be worn for harvest. If the produce contains chemicals, it will be discarded to ensure they are safe to eat even without being washed.

We will not blindly encourage investors as the whole system costs a lot. In fact, in the free market like Hong Kong, the competition is so intense that great varieties of produces are preferred.

13. Who are the major investors?

All of them are local and they invest owing to their own interest and enthusiasm to the new technology. This new production method may attract young people too.

14. Why those people who cooperate with you don't invest in organic farming as the profit there is really attractive?

There are lot of limitations and specific requirements in organic farming, such as, large amount of manpower and soil quality. However, it just depends on that person.

15. We visited some organic farms before but most of them were not interested in the biosensors and the detection of NPK. Some of them even referred us to hydroponics. Why?

If they suggested like this, they are not a real organic farmer. They are just a farmer who can't get the real idea of organic farming. They are merely adopting the methods of organic farming. The final goal of organic farming is to maintain the sustainability of soil while farming. The ecology above and under soil should be balanced. There are few points that we have to know for balancing: types of plants, maintenance of soil, balance of bacteria in soil, farming programme and pattern.

16. If GM bacteria is put into the soil, will it violate the principle of organic farming?

Yes. Although I am not really familiar with the GM bacteria, we won't choose the product containing this kind of stuff. But it is better to consult professionals first. For the time being, I don't think biosensors can be applied in hydroponics as we don't need bacteria to enhance the NPK.

17. The biosensors are not used to produce NPK. In fact, it is used for detection of NPK and light signals will be given out.

Oh I see, it is like an indicator without the ability to tell how much the users add or reduce the amount of nutrients. It will be too late if we have to wait for the signal. The system we are using now is more practical as they can response to the concentration automatically.

18. You had mentioned the sponge before, are they connected together?

Yes, we will place the seeds there so that their roots can grab it and absorb the nutrients. However, we have to avoid algae to grow on the sponge.

19. Do the sensors pass through the sponge?

Not exactly, the sensors are in the containers.

20. Is it quite useless for you to install the biosensors for every layer?

Yes, we have to use the pre-mixed solution and detect the immediate changes which cannot be achieved by biosensors.

21. Is the system working constantly?

Yes

22. Solution is added to it constantly with the regulation of the detector. Do the plants need so much of nutrients?

No, it is better for them to grow in dynamic nutrients solution by immersing part of their roots in it.

23. The bacteria in the biosensors will be fixed on the tips of the biosensors. It should be safe.

But their detection range is narrow. It is better for you to focus on the conventional farms.

24. Does the amount of nutrients enough for the plants to use for 21 days with the specific flow rate?

It does as we consulted some experts before but we don't know about the flow rate.

25. Have you encountered some circumstances that the plants couldn't grow even though you use the same recipe?

We haven't but the weight and the texture will be affected if the growth duration changes. As I mentioned, environment, air quality, nutrients, carbon dioxide, temperature, humidity and light intensity are far crucial than that.

26. Will the plants compete for nutrients intensely as they are fixed on the sponge? Will it lead to any delay of harvesting?

No, the supplement of nutrients should be enough due to the dynamic solution. It will only be affected if there is too much algae to lower the aeration. Therefore, we have to clean the apparatus constantly and the new sponge will be used every time. If the biosensors can detect any harmful organisms in short period of time, it will be good.

27. How can you know there is harmful algae? (AFCD)

We have to test and analyse from the samples to identify whether the algae is harmful or not. We can prevent them by adding more oxygen and ensure that the water is clean.